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Thinking in Systems by Donella Meadows

Thinking in Systems is an introduction to systems theory that relies upon intuition to guide its reader down a path that may normally be veiled in technicalities. Meadows divides the content into 3 parts; explaining what systems are and how they work, how systems relate to us, and how we can leverage them to create beneficial change.

Meadows begins by introducing the concept of a system as “an interconnected set of elements that is coherently organized in a way that achieves something.” Systems have elements, connections between the elements, and together those connections carry out a function or purpose. Stocks are any quantifiable element in a system. A feedback loop controls the flow of units into or out of a stock based on the quantity available in that same stock.

For the sake of explanation, we’ll use one of Meadows’ simpler examples to understand this vocabulary. The system we’ll look at is a thermostat attempting to keep a room at a comfortable temperature on a cold winter day. The stock, the element we can measure, is the temperature of the room. As it is warmer in the room than it is outside, heat will flow from the room to the outdoors. At the same time, heat is flowing from the furnace into the room. Each of these flows has a respective feedback loop. The greater the discrepancy of temperature between the room and the outdoors, the faster heat will leave the room in an attempt to reach equilibrium. Similarly, as the room becomes colder and colder, the furnace will pump more and more heat into the room. This system has only one stock and two feedback loops. Meadows spends the remainder of the first section of the book iteratively building increasingly complex systems that examine global population, natural resource extraction, and the resiliency of fish populations.

The second section deals with how we interact with systems and how they may surprise us. One major factor that explains our often incorrect hunches is our propensity to think linearly. Systems are nonlinear. “A little tasteful advertising can awaken interest in a product. A lot of blatant advertising can cause disgust for the product.” Another explanation for why our understanding of systems is less than ideal is the concept of nonexistent boundaries. Systems function as abstract models of processes occurring in the real world. A system related to selling cars from a dealership will include ordering inventory from the manufacturer. But that inventory is made from raw materials who are harvested from the earth which is part of a solar system in the Milky Way and so on. A boundary must be drawn to limit the complexity of a system to something rational, inherently excluding elements that might affect the behavior of the system.

The final section explains how to use systems to spark change. Meadows explains that while leverage points are often easily identified by those familiar with a system, they often push them in the wrong direction, making the system worse. She states there is no simple method to determine how to push a leverage point in any system and that each takes time to figure out. She goes on to list a series of potential leverage points, my favorite of which is introducing new information flows. This effectively adds new feedback loops to the system. In a Dutch housing development, electric meters were installed in the basement of some houses

and in the front hall of others. With no differences between the houses, electricity consumption was 30% lower in the houses featuring meters in the front hall.

I like that this book simultaneously aligned with the deconstructivist ethos of this class while maintaining a sense of optimism about the challenges of complexity. Its lessons echo very clearly in the tangled web of interactions surrounding aid workers, indigenous people, local governments, etc.